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PREVENTION THROUGH PERCEPTION: INVESTIGATING THE ROLE OF COGNITIVE-BEHAVIORAL FACTORS IN HEAD LICE CONTROL AMONG KARACHI SCHOOL GIRLS APPLICATION OF HEALTH BELIEVE MODEL

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Abstract

Background: In Pakistan, head lice pose a significant health concern for adolescents, particularly amongst female students. This study delves deeper into this issue by exploring potential links between head lice infestation and the cognitive and behavioral factors present in these young women.

Methods: To investigate the potential connection between cognitive-behavioral factors and head lice infestation among female high school students, a descriptive cross-sectional study was conducted in Karachi, Pakistan, during 2023. A total of 226 participants were carefully selected through a random sampling method, ensuring a representative sample of the student population. These young women actively participated by completing a self-administered questionnaire specifically designed to gather crucial information. The questionnaire comprehensively assessed two key aspects: Cognitive-behavioral factors: This explored various thoughts, beliefs, and behaviors that might influence head lice susceptibility or transmission. This could include factors like knowledge about hygiene practices, social interactions, and coping mechanisms related to itching or stigma. Head lice infestation status: The questionnaire effectively determined whether each participant currently had head lice or had experienced it in the past. This provided valuable data on the prevalence and potential risk factors within the study population.

Results: The study uncovered a distinct pattern when comparing students with and without head lice infestation. Those grappling with the infestation exhibited substantially lower scores in: Perceived severity: They tended to underestimate the seriousness of head lice and its potential consequences, potentially neglecting the urgency of addressing the issue. Perceived benefits: These students saw less value in engaging in preventive measures compared to their lice-free counterparts, possibly diminishing their motivation to adopt consistent hygiene practices. Self-efficacy: Individuals with head lice infestation reported lower confidence in their ability to effectively manage the situation, potentially leading to feelings of helplessness and discouragement.

Conclusion: The study revealed a concerning trend: female students with head lice infestations underestimated the problem's severity, felt less empowered to manage it, and saw less value in preventative measures. Importantly, these factors predicted both infestation and preventative behavior. This suggests targeted health programs could be highly effective. By raising awareness of risks, boosting self-efficacy in hygiene practices, and addressing barriers to prevention, such programs have the potential to significantly reduce head lice infestation among female students in Pakistan.

Keywords: Pediculosis, Preventive Behaviors, Cognitive behavior

Introduction:

The head lice, formally known as *Pediculus humanus capitis*, belong to the Anoplura family and are notorious for causing pediculosis capitis, often called head lice infestation. These unwelcome guests are among the most common ectoparasites plaguing humans worldwide, making head lice infestation a prevalent issue (Torre *et al*., 2017; Ahmed *et al*., 2018). Head lice infestation isn't just an itchy annoyance - it poses a genuine threat to public health. *Pediculus humanus var. capitis*, latch onto the scalp and feed on blood, leaving their victims with a spectrum of unpleasant and potentially harmful consequences. Their saliva triggers an irritating reaction, leading to intense itching (pruritus) that can become relentless. This constant scratching not only increases the risk of secondary bacterial infections but can also lead to eczematous changes, a type of inflamed and irritated skin. Additionally, the close contact necessary for the spread of head lice can facilitate the transmission of other infectious diseases, further amplifying the public health concern. (Muric *et al*., 2018; Amanzougaghene *et al*., 2020). Epidemiological studies act as detectives, piecing together the aenigma of head lice infestation. By analyzing data from diverse populations, they reveal not only the extent of this itchy irritation but also its connection to environmental factors, like hygiene practices or socioeconomic conditions. This knowledge is crucial for identifying the most effective and essential treatment and control approaches. While studies paint a global picture of head lice being quite common among students, location plays a surprising role. The incidence can vary significantly depending on factors like climate, cultural practices, and access to healthcare. Understanding these nuances is key to tailoring prevention and treatment strategies to specific communities. (Louni *et al*.,2018; Kassiri *et al*. 2020).

Head lice, while seemingly harmless, can become a significant concern due to several factors influencing its severity. Age, gender, and even where you live can play a role. While both boys and girls can experience infestations, it's more common in girls. Socioeconomic factors like literacy, family size, and even parents' occupations can contribute. Perhaps surprisingly, the presence of health educators in schools can also impact the prevalence. This itchy issue isn't just an annoyance; it has real social and medical consequences. The estimated 6-12 million head lice infections in US children aged 3-11 annually highlight its global reach. Understanding these influencing factors is crucial for developing effective prevention and treatment strategies, ensuring the well-being of children everywhere (Sanchezruiz *et al*., 2020; Mumcuoglu *et al*., 2021) (CDC, 2019; Ahmed Nasrollahi *et al*., 2018). Studies reveal a worrying trend: families may not be effectively treating head lice infestations. This inadequate treatment raises the alarming possibility of lice developing resistance to commonly used medications. If this happens, combating head lice could become significantly more challenging and require alternative, potentially more complex, solutions (Koch *et al*., 2016). Head lice have been tackled with an arsenal of insecticides over time, from DDT and malathion to modern options like pyrethroids and dimethicone. While most current treatments, including benzyl alcohol and spinosad, are highly effective, the cunning lice possess an unwelcome talent: they can develop resistance. This means that what worked today might not be effective tomorrow, making the fight against head lice an ongoing challenge (Sangaré *et al*., 2016; Arserim *et al*., 2021). Education is a powerful strategy against head lice, but targeting it effectively requires precision. To do that, we need to identify and understand the specific factors contributing to infestations in our communities. With this knowledge, we can develop targeted educational interventions tailored to address the root causes,

not just the symptoms. Selecting the most suitable educational model for training is crucial in this process. Remember, well-designed, programmatic education based on a strong model is a proven strategy for preventing and controlling diseases like head lice (Babazadeh *et al*.,2019; Singhasivanon *et al*.,2019). Theory-based interventions, on the other hand, are like having a well-defined blueprint. They provide a flexible framework that guides the development and evaluation of interventions, making them more effective in influencing health-related behaviors. These theories act like maps, highlighting the key factors that influence behavior and how to target them effectively. This leads to more targeted and efficient interventions, ultimately leading to better health outcomes (Nasirzadeh *et al*.,2021). Scientists understand the power of a good plan when it comes to changing health habits. That's why they've developed various "blueprints" called theoretical frameworks to guide their interventions. One such framework, the Health Belief Model (HBM), has a proven track record of success in promoting healthy behaviors and preventing diseases (Barati *et al*.,2022) The Health Belief Model posits that an individual's perceptions of susceptibility, severity, and benefits regarding a health issue, along with their perceived self-efficacy in addressing it, shape their motivation and health-related behaviors (Moshki *et al*.,2017). The Health Belief Model (HBM) doesn't just tell us what influences health behavior, it tells us why. It dives into six key factors that shape our decisions: Am I at risk? (Perceived susceptibility): How likely do we think we are to get a particular health problem? How bad could it be? (Perceived severity): How serious are the potential consequences of this health problem? Is it worth the effort? (Perceived benefits): Will taking action (like exercising or getting vaccinated) actually make a difference? What's stopping me? (Perceived barriers): Are there costs or challenges that make it hard to take action? Time to take action! (Cues to action): What triggers us to actually make a change, like a doctor's advice or a reminder from a friend? Can I do it? (Perceived self-efficacy): Do we believe we have the skills and confidence to succeed in making the change? (*Oncu et al*.,2018) This study tackles a sensitive issue often brushed aside: head lice infestation in school-age girls. While the physical discomfort is undeniable, the impact goes far beyond itchy scalps. Recognizing the potential psychosocial, economic, and even cultural consequences, this research investigates deeper into the connection between head lice and the thoughts, beliefs, and behaviors (cognitive-behavioral factors) of young women. By using both theory and practical strategies, the study aims to shed light on this complex issue. This knowledge is crucial for developing effective educational interventions that address the root causes of head lice infestations and empower girls to manage their health and well-being (Dehghani Tafti *et al*.,2018; Daneshvar *et al*.,2019)

Methods

226 high school girls in Karachi, Pakistan, participate in this study. Conducted in 2023, it used a two-step approach to ensure a representative sample: Picking schools fairly: 4 schools were randomly chosen, giving each school an equal chance of being included. Selecting students randomly: Within each chosen school, a systematic method was used to pick students from the entire list, ensuring everyone had a fair chance of being involved. To ensure the study focused on the relevant population, only female students currently attending secondary school in Karachi were eligible to participate. Additionally, their willingness to participate and complete the study was crucial. Conversely, students who couldn't complete the questionnaire fully or accurately were excluded. Interestingly, the we didn't develop a brand new survey. Instead, they relied on a well-established and published instrument created by Moshki *et al*. This questionnaire, originally in Persian, was specifically designed to evaluate school-age children's thoughts and beliefs about head lice based on the Health Belief Model (HBM). It gathered both demographic information (age, parental occupation and education, past lice experience) and knowledge about head lice through nine specific questions (e.g., "Can head lice spread from one person to another?"). Testing knowledge and beliefs: Each question about head lice knowledge had three possible answers: yes (3 points), don't know (2 points), and no (1point). Higher scores indicated more knowledge. The Health Belief Model (HBM) constructs were measured using 20 statements (5 per construct). Participants rated their agreement on a 5-point scale: completely disagree (1) to completely agree (5). Self-efficacy, or confidence in managing head lice, was assessed

with five statements rated on a 5-point scale: very low (1) to too much (5). Two questions addressed cues to action, like who helps participants prevent head lice. Assessing behaviors: Five questions evaluated preventive behaviors, like how often hair was combed in the past month. Answers were: always (3 points), sometimes (2 points), and never (1 point). Reliability and validity: The original study by Moshki *et al*. reported good reliability for each construct (0.74 - 0.86). In this study, experts in health education and parasitology confirmed the questionnaire's validity for measuring intended concepts. Before diving into the main study, the we conducted a pilot test with 20 students. These students were not included in the final results. This pilot test helped ensure the questionnaire worked well, and they calculated a score called Cronbach's alpha for each section. This score, ranging from 0 to 1, indicates how reliable the questions are in measuring what they intend to. Higher scores mean more reliable results, and in this case, all sections scored well (0.75 to 0.89).

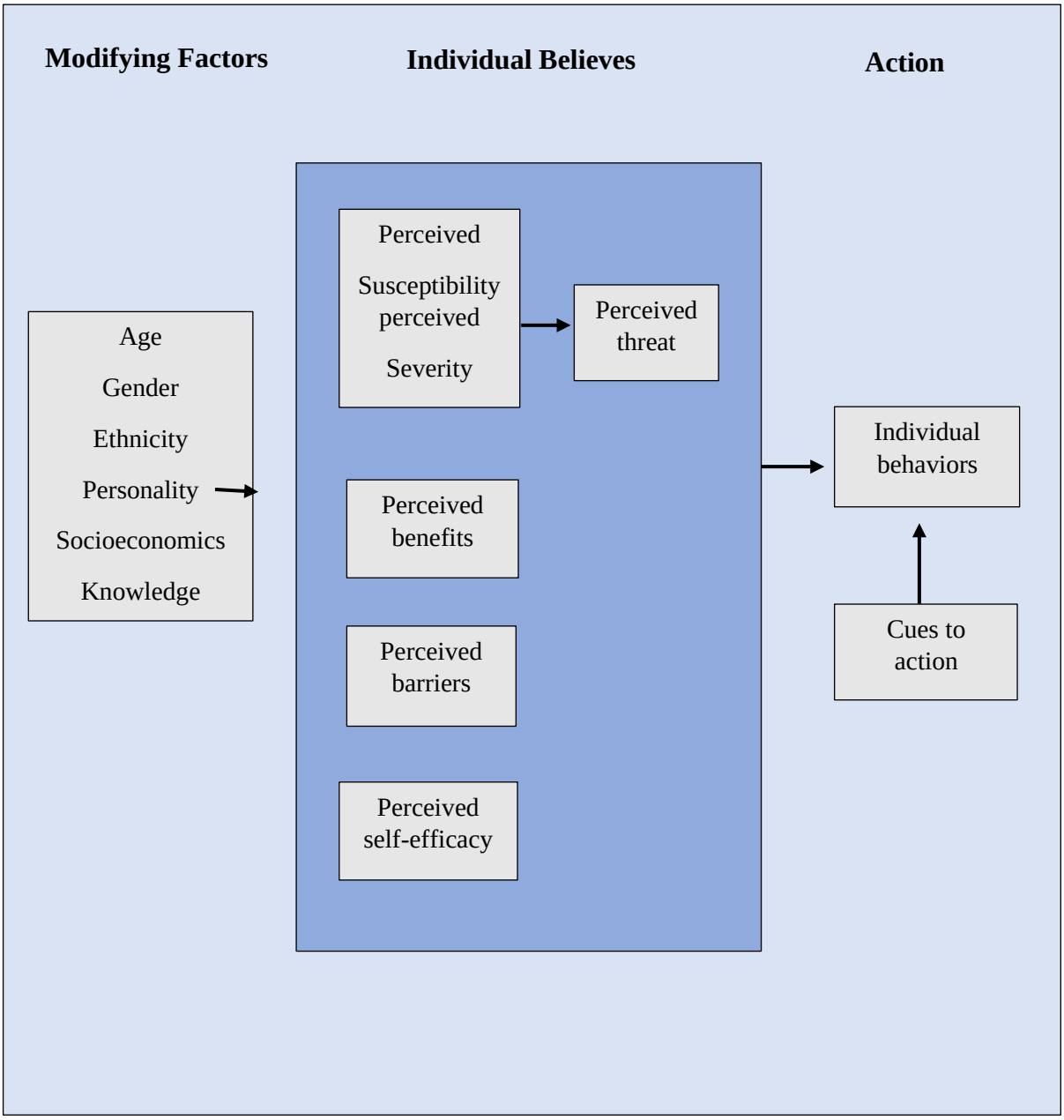

Figure 1. Health Belief Model Component and Linkages.

Data analysis

We used SPSS version 24 to analyze data. We performed descriptive statistic, performed t-test to examine group differences and performed Chi- square test to measure the categorical variable we

measured binary variable. Best predictor for head lice infestation performed logistic regression. To examine the practical significance of the predictors we performed odd ratio and multiple regression to identify the best predictor of preventive behavior and level of significance was 0.05.

Results

The study looked at 226 girls aged 9-16, of which 55 (around 24%) had head lice (Table 1). Interestingly, factors like age and family income didn't seem to be linked to head lice, except for mothers' education. Girls with more educated mothers were less likely to have head lice. We then compared groups with and without head lice based on key factors (Table 2). We found: Girls with head lice valued the problem as less severe and believed benefits of prevention were lower. They also felt less confident in their ability to manage head lice (lower self-efficacy). They engaged in fewer preventive behaviors like regular hair combing (Table 3). To pinpoint what predicted having head lice, we used a more advanced analysis (logistic regression, Table 4). It was found that: Lower perceived severity, benefits, and self-efficacy significantly increased the odds of having head lice. In other words, girls who underestimated the seriousness, benefits of prevention, and their own ability to manage head lice were more likely to be infested. Finally, we looked at what predicted how often girls engaged in preventive behaviors (Table 5). Again it was found that higher perceived severity, self-efficacy, and benefits were linked to more frequent preventive behaviors. Girls who viewed the issue as more serious, believed in prevention benefits, and felt confident in managing head lice were more likely to take steps to avoid them. Overall, the study highlights the importance of educating girls about the seriousness of head lice and the benefits of prevention. Building their confidence in managing the issue.

Discussion

Head lice infestation persists as a critical health issue in low- and middle-income countries, even as public health advances worldwide. This calls for targeted action to address this persistent challenge (Amanzougaghene *et al*., 2020). A recent study revealed a concerning trend: head lice infestations are becoming more common and widespread among elementary school children and the adults who care for them (Bekry *et al*., 2022). A significant number of adolescents in our study (almost 20%) had head lice, reflecting the elevated levels observed in other Iranian studies, often described as "epidemic." (Alizadeh-Siuki *etal*.,2023), and specially among girls (Daneshvar et al.,2021). It's crucial to address factors specific to this community, such as hair length and head coverings due to religious dress codes, that may be contributing to the observed high rates of head lice infestation (Saghafipour *et al*.,2018). Untreated head lice can easily spread, putting others at risk. Our study found that adolescents with head lice had lower perceived severity scores, meaning they didn't view it as a serious problem. This aligns with research by Shekarbeygi *et al*. who define perceived severity as a person's belief about the seriousness of a health threat (Shekarbeygi *et al*.,2022). One study investigated the potential of "pernicious outcomes," or severe negative consequences, as a motivator for healthy behaviors that can prevent the very illness causing those negative outcomes (Babazadeh *et al*., 2019; Nasirzadeh *et al*.,2021). Our study and Moshki *et al*.'s research identified low perceived severity as a common factor in head lice infestations (Moshki *et al*.,2017). The similar findings in our study and Moshki *et al*. research might be due to both focusing on female participants. This raises the possibility that girls underestimate their risk of getting head lice. Highlighting the potential negative consequences of the infestation, as other research suggests, could be effective in motivating them to adopt preventive behaviors and reduce their chances of getting it (Alizadeh-Siuki *et al*., 2023; Siuki, *et al*.,2023). When creating solutions for head lice, it is crucial for health professionals to remember that the average person might lack proper knowledge about the illness. Our study also found that teens with lice reported lower confidence in managing it, which, according to other research, is a strong predictor of actual infestations (Eftekhari *et al*.,2018). The findings from Moshki *et al*. (2017) highlight the important role of self-efficacy in encouraging head lice prevention among young girls. Their study revealed that self-efficacy explained over 80% of the variation in preventive behaviors, suggesting

that interventions aimed at boosting confidence in managing head lice could be an effective strategy for reducing its spread (Moshki *et al*.,2017). Self-efficacy is a multidimensional construct reflecting an individual's belief in their capabilities to perform a specific task or manage a situation effectively. It is theorized to be influenced by five key factors: mastery experiences, vicarious experiences, verbal persuasion, emotional states, and physiological states (Bekry *et al*.,2022). Self-efficacy, defined as an individual's belief in their capability to perform a specific behavior, has been demonstrated to have a positive impact on health-related behaviors like preventing head lice infestation. Additionally, self-efficacy is frequently assessed as a mediator due to its well-established role and influence in facilitating behavioral change (Bekry *et al*.,2022;). Individuals with enhanced self-efficacy regarding head lice prevention demonstrate higher goal alignment and engage in appropriate behaviors like preventive measures. This supports the notion that belief in the positive outcomes of healthy behaviors motivates their adoption. Educational interventions must prioritize fostering self-efficacy for specific behaviors. Notably, the study's observed prevalence of unhealthy habits like insufficient bathing and combing among infested individuals aligns with previous research findings (Nasirzadeh *et al*.,2021). An Indonesian study on head lice prevention among girls showed that while many reported taking some preventive actions, these actions were often mild or inconsistent. Only a small group reported rarely taking any preventive measures at all (Maramazi *et al*.,2019). This research indorses the link between behavior and head lice infestation. Head lice preventive behaviors were significantly lower among infested students compared to a control group, potentially due to economic, social, and cultural factors. Additionally, perceived severity and self-efficacy predicted nearly 20% of the variation in preventive behaviors. Furthermore, the study highlights the role of direct contact like shared items in lice transmission, emphasizing the importance of promoting healthy behaviors for effective prevention (Yingklang *et al*.,2018)

Conclusions

Head lice pose a significant problem for female adolescents in Pakistan. Our study shows that individuals without head lice held higher beliefs about the seriousness of the issue, the benefits of prevention, and their own ability to prevent it. These factors, perceived severity and self-efficacy, were also strong predictors of both preventive behaviors and actual infestation. This strongly recommends that educational interventions aimed at boosting these perceptions could be highly effective. We recommend that public health authorities collaborate with communities to design and implement such programs, targeting mothers and their school-aged children, school officials, and managers of public places all can play crucial roles in preventing the spread of head lice (Moshki *et al*.,2017; Alizadeh-Siuki *et al*.,2023).

Limitations of Study

This study focused exclusively on female participants, which limits its ability to be applied more broadly to the entire population, including males. Additionally, relying on participants' own memories of past events could potentially affect the accuracy of the collected data. It's important to keep in mind that due to the observational nature of this study, it cannot definitively establish cause-and-effect relationships between the factors examined. These limitations highlight the need for further research that includes a wider range of participants and utilizes methodologies that allow for stronger causal inferences.

Table#1

Demographic Characteristic of Subject				
Variables		**No of Head lice**	**With Head lice**	**P-Value**
Birth order	First	75(42.9)	25(48.9)	
	Second	61(33.1)	9(21.2)	
	Third and above	42(24)	14(29.9)	0.28
No of family members	small (< 5)	90(48)	7(15.5)	
	Medium (< 5-7)	51(25.5)	26(50.1)	

	Big (< 8-10)	40(26.5)	12(35.3)	0.61
Father's Job	Office Work	30(18)	3(5.2)	0.1
	Laborer	48(28)	14(29.1)	
	Teacher	26(13)	8(26.3)	
	Farmer	21(12.1)	10(15.2)	
	Unemployed	28(16)	4(6.1)	
	Other	24(12.9)	10(18.1)	
Mother's Job	Office Work	19(10.1)	4(8.2)	0.17
	Teacher	18(9.1)	10(20.5)	
	House wife	130(73.2)	26(60.5)	
	Other	10(7.6)	7(10.8)	
Mother Education	Illiterate	48 (23.8)	15 (26.1)	0.02
	Primary, Secondary High School	60 (25.6)	9 (19.6)	
	Intermediate	50 (37.8)	15 (37)	
	Master	20(12.8)	8(10.8)	
Father Education	Illiterate	26 (14.6`)	3 (6.5)	0.25
	Primary Secondary High School	57 (31.7)	19 (41.3)	
	Intermediate	62 (41.1)	24 (42.3)	
	Master	25(12.6)	10(9.9)	

Table#2

Comparisons of Heath belief model (with and without head lice)				
Variable	**Status**	**Mean**	**Mean differences**	**P-Value**
Knowledge	With Headlice	22.97 (±5.33)	- 0.25 (- 1.70 to 1.05)	0.80
	Without head lice	21.73 (± 3.43)		
Perceived Susceptibility	With Headlice	18.97 (±3.33)	- 0.67 (- 1.99 to 0.76)	0.27
	Without head lice	19.20 (±4.99)		
Perceived Severity	With Headlice	17.10 (±3.83)	- 4.21 (3.19–4.99)	<0.05
	Without head lice	21.46 (±4.33)		
Perceived Barriers	With Headlice	13.9 (±5.74)	- 1.17 (- 3.15 to 0.79)	0.24
	Without head lice	12.02 (±6.41)		
Perceived Benefits	With Headlice	18.97 (±5.39)	2.10 (0.16–5.02)	<0.05
	Without head lice	20.1 (±6.13)		
Cues to Action	With Headlice	5.34 (±1.44)	0.09 (- 0.91 to 0.87	0.79
	Without head lice	5.11 (±3.11)		
Perceived Self-efficacy	With Headlice	14.11 (±3.45)	2.81 (1.89–3.22)	<0.05
	Without head lice	19.1 (±51.99)		

Table#3

Preventive Behavior	**No head lice**			**with head lice**			**P-value**
	Always	**Some Time**	**Never**	**Always**	**Some Time**	**Never**	
	F%	**F%**	**F%**	**F%**	**F%**	**F%**	
Combing Hair	150 (86.1)	15 (8.3)	11(5.6)	19 (32.0)	15 (32.4)	16 (35.6)	<0.05
Bathing	149 (82.9)	29 (12.3)	3 (3.8)	6 (3.2)	14 (35.9)	26 (60.9)	<0.05

Combing and brushing	159 (83.9)	22 (16.1)	0(0.0)	5 (12.9)	24 (46.2)	16 (40.9)	<0.05
Shared personal hygiene products	136 (75.2)	32 (19.8)	9 (4.0)	15 (37.0)	15 (25.0)	19 (38.0)	<0.05
Personal Mattress and Blanket	160 (87.2)	21 (9.9)	2 (2.9)	6 (11.9)	17 (34.6)	23 (5.5)	<0.05

Table#4

Logistic regression analysis to predict head lice infestation			
Variable	**OR**	**95% C.I for OR**	**P-value**
Knowledge	1.03	0.89 to 1.3	0.60
Perceived susceptibility	1.08	0.91 to 1.17	0.21
Perceived severity	0.69	0.75 to 0.91	<0.05
Perceived benefits	0.89	0.79 to 0.88	<0.05
Perceived barriers	1.07	0.91 to 1.11	0.26
Cues to action	0.99	0.79 to 1.13	0.79
Perceived self-efficacy	0.81	0.59 to 0.91	<0.05

Table#5

Linear regression analysis to predict head lice preventive behaviors			
Variable	***B***	**Standardized Coefficient**	**P-value**
Knowledge	0.03	0.02	0.70
Perceived susceptibility	0.17	0.03	0.55
Perceived severity	0.18	0.45	<0.05
Perceived benefits	0.06	0.03	0.59
Perceived barriers	0.05	0.15	0.07
Cues to action	-0.05	-0.03	0.81
Perceived self-efficacy	0.17	0.41	<0.05

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